

10/537800

AMENDMENTS TO THE CLAIMS:

JC17 Rec'd PCT/PTO 07 JUN 2005

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-22 (cancelled)

23. (new) A method of generating a modulated navigation signal (7) which is intended to be used to position a downlink receiver (6), comprising multiple pseudorandom navigation codes of chip rhythms greater than 0.5 MHz, modulated onto a carrier of frequency f_p greater than 500 MHz, wherein four pseudorandom navigation codes C_1 , C_2 , C_1' , C_2' are modulated onto the carrier according to an 8-PSK modulation of constant amplitude with a modulation frequency f_M such that:

$$8f_c \leq f_M$$

where $f_c = \text{Max}(f_{ci})$, and f_{ci} designates the chip rhythms f_{c1} , f_{c1}' , f_{c2} , f_{c2}' of the navigation codes C_1 , C_2 , C_1' , C_2' , each f_{ci} value being such that $f_M = N_i \cdot f_{ci}$, N_i being an integer greater than or equal to 8, two navigation codes C_1 , C_1' being quadrature modulated at frequency $f_1 = f_p - f_M/8$, and two other navigation codes C_2 , C_2' being quadrature modulated at frequency $f_2 = f_p + f_M/8$, and the modulated navigation signal presenting a constant envelope.

24. (new) A method as claimed in claim 23, wherein f_M is chosen to be ≤ 400 MHz.

25. (new) A method as claimed in claim 23, for generating a modulated navigation signal (7) on board a space satellite, wherein f_M is chosen to be ≤ 200 MHz.

26. (new) A method as claimed in claim 23, wherein 8-PSK modulation of symmetrical constant amplitude in the Fresnel plan is used.

27. (new) A method as claimed in claim 23, wherein 8-PSK modulation of asymmetrical constant amplitude in the Fresnel plan is used.

28. (new) A method as claimed in claim 23, wherein 8-PSK modulation of phase states equal to $k\pi/4$, where k is an integer between 1 and 8, is used.

29. (new) A method as claimed in claim 23, wherein the four codes are modulated according to a truth table which is chosen from the group of truth tables formed from:

TABLE 1

C1(t)	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
C2(t)	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
C1'(t)	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
C2'(t)	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1
t modulo 8TM																
[0, TM[	P5	P4	P4	P3	P6	P7	P5	P2	P6	P1	P3	P2	P7	P8	P8	P1
[TM, 2TM[	P5	P8	P4	P3	P6	P7	P5	P6	P2	P1	P3	P2	P7	P8	P4	P1
[2TM, 3TM[	P1	P8	P4	P7	P6	P7	P5	P6	P2	P1	P3	P2	P3	P8	P4	P5
[3TM, 4TM[	P1	P8	P8	P7	P2	P7	P5	P6	P2	P1	P3	P6	P3	P4	P4	P5
[4TM, 5TM[	P1	P8	P8	P7	P2	P3	P1	P6	P2	P5	P7	P6	P3	P4	P4	P5
[5TM, 6TM[	P1	P4	P8	P7	P2	P3	P1	P2	P6	P5	P7	P6	P3	P4	P8	P5

[6TM, 7TM[	P5	P4	P8	P3	P2	P3	P1	P2	P6	P5	P7	P6	P7	P4	P8	P1
[7TM, 8TM[	P5	P4	P4	P3	P6	P3	P1	P2	P6	P5	P7	P2	P7	P8	P8	P1

TABLE 2

C1(t)	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
C2(t)	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
C1'(t)	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
C2'(t)	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1
t modulo 8TM																
[0, TM[	P1	P8	P4	P7	P6	P7	P5	P6	P2	P1	P3	P2	P3	P8	P4	P5
[TM, 2TM[	P1	P8	P8	P7	P2	P7	P5	P6	P2	P1	P3	P6	P3	P4	P4	P5
[2TM, 3TM[	P1	P8	P8	P7	P2	P3	P1	P6	P2	P5	P7	P6	P3	P4	P4	P5
[3TM, 4TM[	P1	P4	P8	P7	P2	P3	P1	P2	P6	P5	P7	P6	P3	P4	P8	P5
[4TM, 5TM[	P5	P4	P8	P3	P2	P3	P1	P2	P6	P5	P7	P6	P7	P4	P8	P1
[5TM, 6TM[	P5	P4	P4	P3	P6	P3	P1	P2	P6	P5	P7	P2	P7	P8	P8	P1
[6TM, 7TM[	P5	P4	P4	P3	P6	P7	P5	P2	P6	P1	P3	P2	P7	P8	P8	P1
[7TM, 8TM[	P5	P8	P4	P3	P6	P7	P5	P6	P2	P1	P3	P2	P7	P8	P4	P1

where P1, P2, P3, P4, P5, P6, P7, P8 are the various contacts and the 8-PSK constellation, and TM = 1/fM, and other truth tables derived from these truth tables TABLE 1 and TABLE 2 by phase rotation by $n\pi/4$, $n \in \{1, 2, 3, 4, 5, 6, 7\}$ and/or reversal of the direction of the path of the constellation.

30. (new) A method as claimed in claim 23, wherein fp is between 1000 MHz and 1700 MHz.

31. (new) A method as claimed in claim 23, wherein fc is of the order of 10 MHz.

32. (new) A method as claimed in claim 23, wherein fM is of the order of 120 MHz.

33. (new) A method as claimed in claim 23, wherein in at least one pair of codes C1, C1'; C2, C2' which are quadrature modulated onto the same frequency, one of said codes C1'; C2' incorporates digital data which is modulated according to a frequency less than $fc/1000$.

34. (new) A device for generating a modulated navigation signal which is intended to be used to position a downlink receiver, comprising multiple pseudorandom navigation codes of chip rhythms greater than 0,5 MHz, modulated onto a carrier of frequency fp greater than 500 MHz, this device comprising:

- a circuit to generate pseudorandom navigation codes,
- a phase-shifting modulator circuit which supplies the modulated navigation signal on the carrier,
- an emitter circuit, comprising at least one power amplification stage, and suitable for emitting a radio frequency signal corresponding to the modulated navigation signal,

wherein the modulator circuit is suitable for modulating, on the carrier, four pseudorandom navigation codes C1, C2, C1', C2' of which the frequencies are an integer multiple of one of them fc , according to an 8-PSK modulation of constant amplitude with a modulation frequency fM such that:

$$8fc \leq fM$$

where $fc = \text{Max}(fc_i)$, and fc_i designates the chip rhythms $fc1, fc1', fc2, fc2'$ of the navigation codes C1, C2, C1', C2', each fc_i value being such that $fM = Ni \cdot fci$, Ni being an integer

greater than or equal to 8, two navigation codes $C1, C1'$ being quadrature modulated at frequency $f1 = fp-fM/8$, and two other navigation codes $C2, C2'$ being quadrature modulated at frequency $f2 = fp+fM/8$, and the modulated navigation signal presenting a constant envelope.

35. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for implementing an 8-PSK modulation with a modulation frequency $fM \leq 400$ MHz.

36. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for implementing an 8-PSK modulation with a modulation frequency $fM \leq 200$ MHz.

37. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for implementing 8-PSK modulation of symmetrical constant amplitude in the Fresnel plan.

38. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for implementing 8-PSK modulation of asymmetrical constant amplitude in the Fresnel plan.

39. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for implementing 8-PSK modulation of phase states equal to $k\pi/4$, where k is an integer between 1 and 8.

40. (new) A device as claimed in claim 34, wherein the modulator circuit is suitable for modulating the four codes according to a truth table which is chosen from the group of truth tables formed from:

TABLE 1

C1(t)	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
C2(t)	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
C1'(t)	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
C2'(t)	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1
t modulo 8TM																
[0, TM[	P5	P4	P4	P3	P6	P7	P5	P2	P6	P1	P3	P2	P7	P8	P8	P1
[TM, 2TM[	P5	P8	P4	P3	P6	P7	P5	P6	P2	P1	P3	P2	P7	P8	P4	P1
[2TM, 3TM[	P1	P8	P4	P7	P6	P7	P5	P6	P2	P1	P3	P2	P3	P8	P4	P5
[3TM, 4TM[	P1	P8	P8	P7	P2	P7	P5	P6	P2	P1	P3	P6	P3	P4	P4	P5
[4TM, 5TM[	P1	P8	P8	P7	P2	P3	P1	P6	P2	P5	P7	P6	P3	P4	P4	P5
[5TM, 6TM[	P1	P4	P8	P7	P2	P3	P1	P2	P6	P5	P7	P6	P3	P4	P8	P5
[6TM, 7TM[	P5	P4	P8	P3	P2	P3	P1	P2	P6	P5	P7	P6	P7	P4	P8	P1
[7TM, 8TM[	P5	P4	P4	P3	P6	P3	P1	P2	P6	P5	P7	P2	P7	P8	P8	P1

TABLE 2

C1(t)	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
C2(t)	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
C1'(t)	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
C2'(t)	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1
t modulo 8TM																
[0, TM[	P1	P8	P4	P7	P6	P7	P5	P6	P2	P1	P3	P2	P3	P8	P4	P5
[TM, 2TM[	P1	P8	P8	P7	P2	P7	P5	P6	P2	P1	P3	P6	P3	P4	P4	P5
[2TM, 3TM[	P1	P8	P8	P7	P2	P3	P1	P6	P2	P5	P7	P6	P3	P4	P4	P5
[3TM, 4TM[	P1	P4	P8	P7	P2	P3	P1	P2	P6	P5	P7	P6	P3	P4	P8	P5
[4TM, 5TM[	P5	P4	P8	P3	P2	P3	P1	P2	P6	P5	P7	P6	P7	P4	P8	P1
[5TM, 6TM[	P5	P4	P4	P3	P6	P3	P1	P2	P6	P5	P7	P2	P7	P8	P8	P1
[6TM, 7TM[	P5	P4	P4	P3	P6	P7	P5	P2	P6	P1	P3	P2	P7	P8	P8	P1
[7TM, 8TM[	P5	P8	P4	P3	P6	P7	P5	P6	P2	P1	P3	P2	P7	P8	P4	P1

where P1, P2, P3, P4, P5, P6, P7, P8 are the various contacts and the 8-PSK constellation, and $TM = 1/fM$, and other truth tables derived from these truth tables TABLE 1 and TABLE 2 by phase rotation by $n\pi/4$, $n \in \{1, 2, 3, 4, 5, 6, 7\}$ and/or reversal of the direction of the path of the constellation.

41. (new) A device as claimed in claim 34, wherein fp is between 1000 MHz and 1700 MHz.

42. (new) A device as claimed in claim 34, wherein fc is of the order of 10 MHz.

43. (new) A device as claimed in claim 34, wherein fM is of the order of 120 MHz.

44. (new) A device as claimed in claim 34, which is adapted so that in at least one pair of codes which are quadrature modulated onto the same frequency, one of said codes $C1'$, $C2'$ incorporates digital data which is modulated according to a frequency less than $fc/1000$.